

REMARKS

Claims 1, 3-9, 11-16, and 18 remain pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

DRAWINGS

The drawings stand objected to for certain informalities. Applicant attaches revised drawings for the Examiner's approval. In the "Replacement Sheet" FIG. 15 is amended by adding the label "Prior Art" thereto. Therefore, Applicant believes that the objection to FIG. 15 should be withdrawn.

SPECIFICATION

The specification stands objected to for certain informalities. Applicant amends the specification to correct a minor typographical error in that "FCC" is changed to "FFC". Therefore, reconsideration and withdrawal of this objection are respectfully requested.

CLAIM OBJECTIONS

Claims 1-8 stand objected to due to an informality in Claim 1. The minor syntax error "A drive device of a liquid droplet discharge head comprising a piezoelectric vibrator *and* discharges" in original claim 1 is changed to "A drive device of a liquid droplet discharge head comprising a piezoelectric vibrator which discharges" in accordance with the suggestion of the Examiner. Therefore, Applicant believes that the objection to claim 1 should be withdrawn.

REJECTION UNDER 35 U.S.C. § 102

Claims 1-3 and 9-11 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Hayami et al. (U.S. Pat. No. 4,072,958). This rejection is respectfully traversed.

Applicant amends Claims 1 and 9 to recite that "said drive waveform is free of sharp edges". The basis for these amendments can be found in original claims 2 and 10. In accordance with the amendment, original claims 2 and 10 are cancelled. Other amendments made to original claims 1 and 9 are made just for the purpose of further clarification. Therefore, no new matter is added.

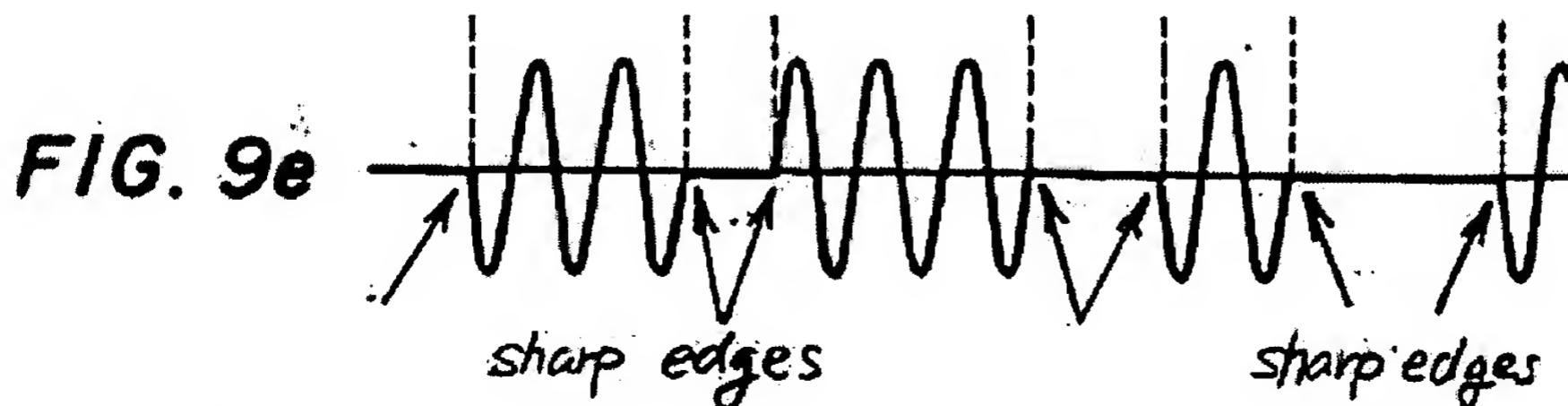
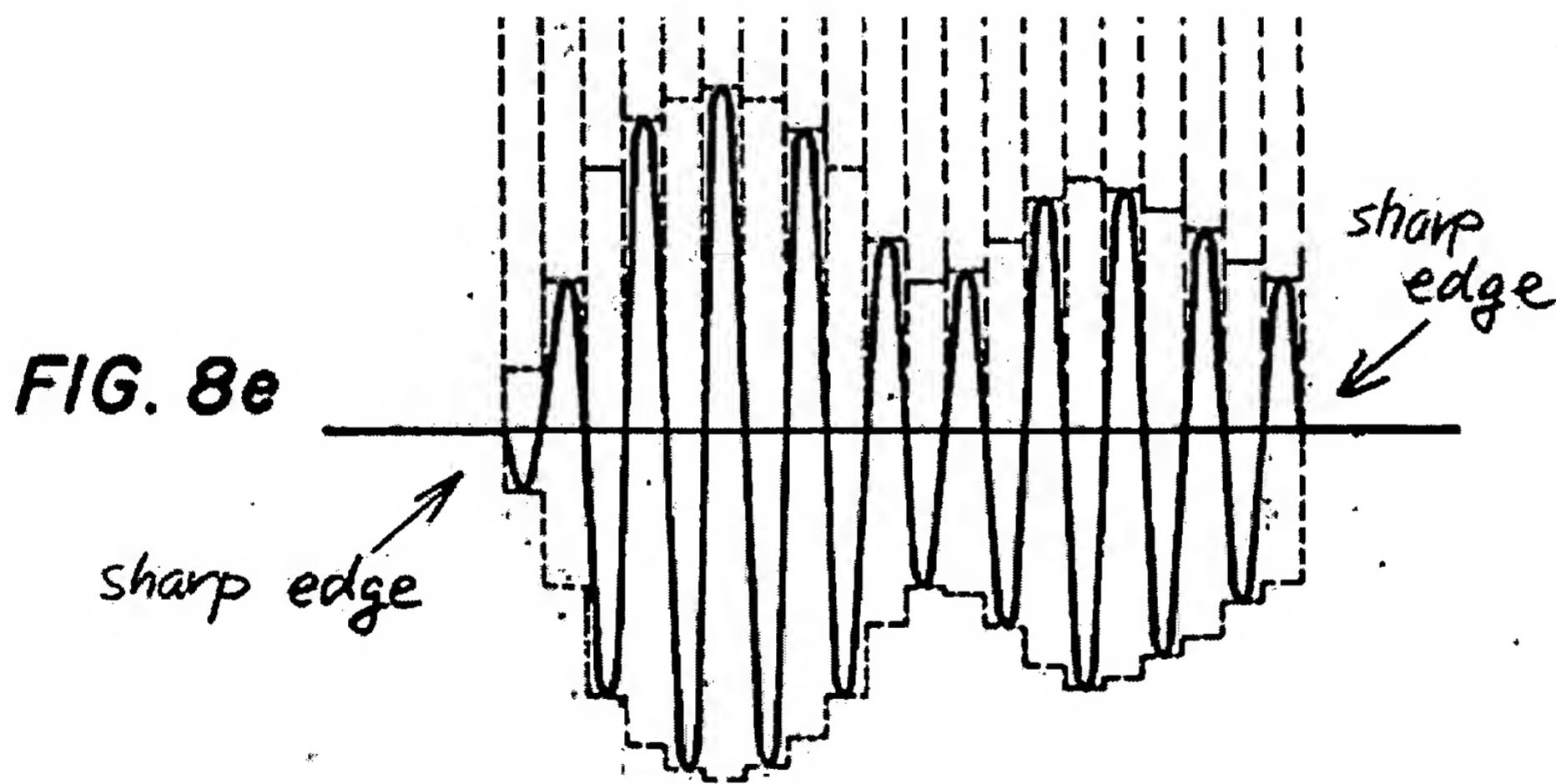
Regarding the novelty of claims 1 to 3 and 9 to 11 in view of US Patent No. 4,072,958 (hereinafter "Hayami et al."), please consider the following. The drive device of the liquid droplet discharge head according to currently amended claim 1 and the drive method of the liquid droplet discharge head according to currently amended claim 9 include a unique feature, that is, the drive waveform applied to the piezoelectric vibrator is *free of sharp edges*.

As mentioned from page 4, line 15 to page 5, line 2, in the specification of the present invention, since the piezoelectric vibrator is driven by the drive waveform which is free of sudden transition points caused by sharp edges in the drive waveform, changes in the operating state of the piezoelectric vibrator are more gradual, thereby inhibiting undesirable increases in mechanical and thermal loads. Furthermore, since the piezoelectric vibrator is driven by the drive waveform that is free of sudden transition points, changes in the operating state of the piezoelectric vibrator are more gradual,

thereby making it possible to more effectively inhibit increases in mechanical and thermal loads. Thus, stable liquid droplets can be discharged from the liquid droplet discharge head for a long period of time.

Accordingly, the present invention can achieve an object, that is, "to provide a drive device of a liquid droplet discharge head, a film manufacturing apparatus, a drive method of a liquid droplet discharge head, a film manufacturing method, and electronic equipment and a device production method that enable the operation of discharging stable liquid droplets to be performed over a long period of time by inhibiting deterioration of the piezoelectric vibrator" as stated on page 3, line 17 to 22, in the specification of the present invention.

Hayami et al. discloses output waveforms (i.e., drive waveforms) in FIGS. 8e and 9e. However, as shown below, each output waveform has "sharp edges".



Hayami et al. does not disclose or suggest driving a piezoelectric vibrator using a drive waveform which is *free of sharp edges*. Furthermore, Hayami et al. does not disclose or suggest problems due to a drive waveform with sharp edges (i.e., since operating state of the piezoelectric vibrator changes suddenly at each transition point (i.e., at each point of sharp edges), the mechanical and thermal loads on the piezoelectric vibrator increase, thereby resulting in the problems of accelerated deterioration of the element and prevention of discharge of stable liquid droplets).

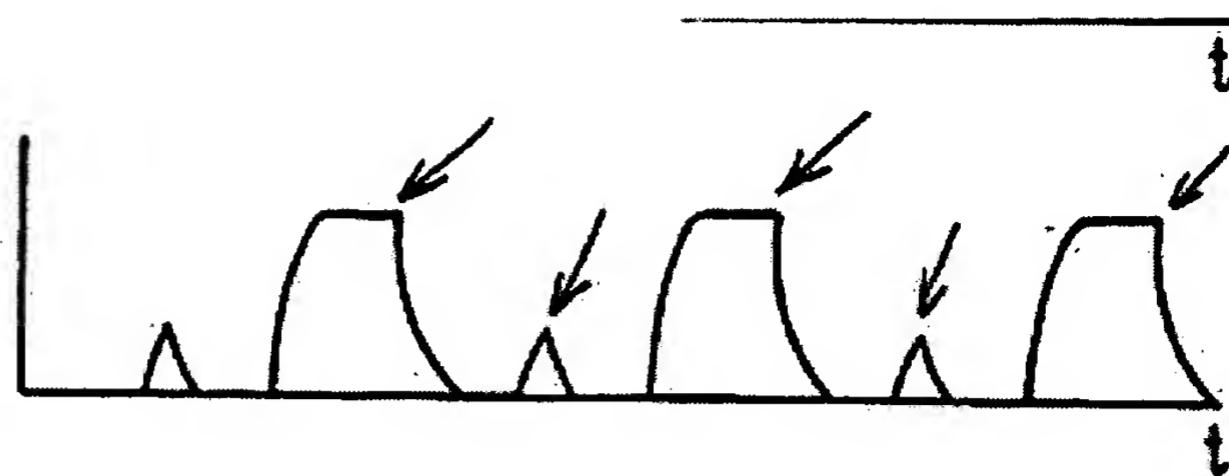
As explained above, each of currently amended claims 1 and 9 of the present invention is novel and non-obvious in view of Hayami et al. at least since currently amended claims 1 and 9 contain the above-mentioned unique features which result in the above-mentioned benefits. Therefore, Applicant believes that currently amended claims 1 and 9 should be allowable.

In addition, claim 3 depends from allowable claim 1 and therefore should also be allowable. Furthermore, claims 10 and 11 depend from allowable claim 9 and therefore should also be allowable.

Claims 1, 3, 4, 9, 11 and 12 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Murakami et al. (U.S. Pat. No. 4,563,689). This rejection is respectfully traversed.

Murakami et al. discloses driving pulse waveforms such as shown in FIG. 4b. However, as shown below, the driving pulse waveform has “sharp edges”.

FIG. 4b



Murakami et al. does not disclose or suggest driving a piezoelectric vibrator using a drive waveform which is *free of sharp edges*. Furthermore, Murakami et al. does not disclose or suggest the above-mentioned problems due to a drive waveform with sharp edges.

As explained above, each of currently amended claims 1 and 9 of the present invention is novel and non-obvious in view of Murakami et al. at least since currently amended claims 1 and 9 contain the above-mentioned unique features which result in the above-mentioned benefits. Therefore, Applicant believes that currently amended claims 1 and 9 should be allowable.

In addition, claims 3 and 4 depend from allowable claim 1 and therefore should also be allowable. Furthermore, claims 11 and 12 depend from allowable claim 9 and therefore should also be allowable.

Claim 17 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Kashiwazaki et al. (U.S. Pat. No. 5,593,757). This rejection is respectfully traversed. Although applicant does not necessarily agree, to expedite prosecution, Claim 17 is cancelled. Therefore, the rejection of claim 17 is moot.

REJECTION UNDER 35 U.S.C. § 103

Claims 5, 6, 13, 14, 17 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami et al. (U.S. Pat. No. 4,563,689) in view of Kashiwazaki et al. (U.S. Pat. No. 5,593,757). This rejection is respectfully traversed.

Kashiwazaki et al. does not disclose or suggest a drive waveform which is *free of sharp edges* as called for in amended claims 1 and 9. Therefore, Applicant believes that claims 5 and 6 are non-obvious in view of Murakami et al. and Kashiwazaki et al. since claims 5 and 6 depend from allowable claim 1, and therefore should also be allowable. In addition, Applicant believes that claims 13, 14, and 18 are non-obvious in view of Murakami et al. and Kashiwazaki et al. since claims 13, 14, and 18 depend from allowable claim 9, and therefore should also be allowable.

Claims 5, 7, 13, 15, 17 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami et al. (U.S. Pat. No. 4,563,689) in view of "A novel RGB multicolor light-emitting polymer display by Kobayashi et al. This rejection is respectfully traversed.

Kobayashi et al. does not disclose or suggest a drive waveform which is *free of sharp edges* as called for in amended claims 1 and 9. Therefore, Applicant believes that claims 5 and 7 are non-obvious in view of Murakami et al. and Kobayashi et al. since claims 5 and 7 depend from allowable claim 1, and therefore should also be allowable. In addition, Applicant believes that claims 13, 15, and 18 are non-obvious in view of Murakami et al. and Kobayashi et al. since claims 13, 15, and 18 depend from allowable claim 9, and therefore should also be allowable.

Claims 5, 8, 13, 16, 17 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami et al. (U.S. Pat. No. 4,563,689) in view of the abstract of JP 2002-134878. This rejection is respectfully traversed.

JP 2002-134878 does not disclose or suggest a drive waveform which is *free of sharp edges* as called for in amended claims 1 and 9. Therefore, Applicant believes that claims 5 and 8 are non-obvious in view of Murakami et al. and JP 2002-134878 since claims 5 and 8 depend from allowable claim 1, and therefore should also be allowable. In addition, Applicant believes that claims 13, 16, and 18 are non-obvious in view of Murakami et al. and Kobayashi et al. since claims 13, 15, and 18 depend from allowable claim 9, and therefore should also be allowable.

CONCLUSION

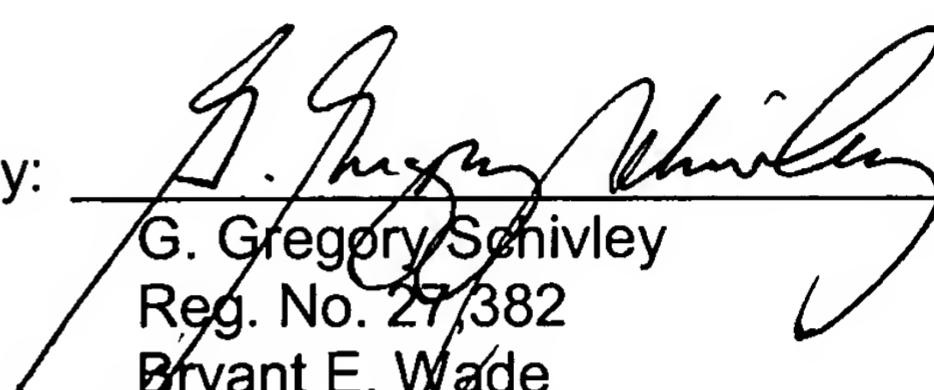
It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested.

If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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[GGS/BEW/jmz]

AMENDMENTS TO THE DRAWINGS

The attached "Replacement Sheet" of drawings includes changes to Figure 15.

The attached "Replacement Sheet," which includes Figure 15, replaces the original sheets including Figure 15.

Attachment: Replacement Sheet